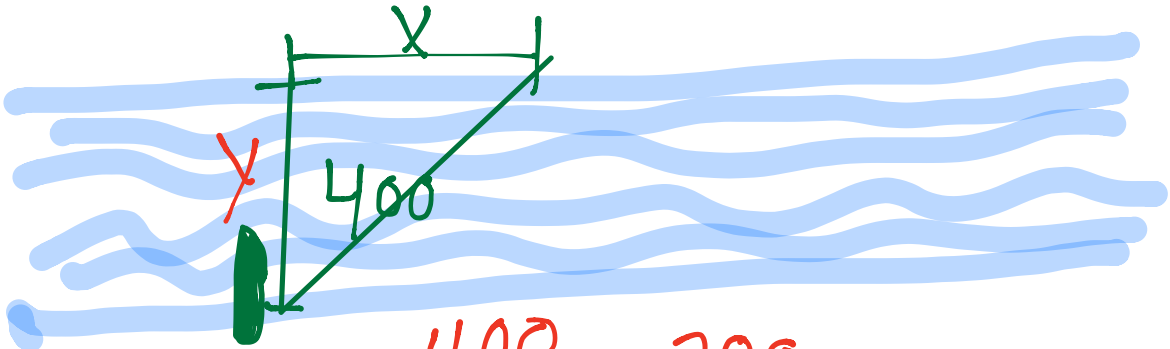
Relative Motion - 2-D

motion where the object is being pushed ⊥ to it's motion.

River Problem

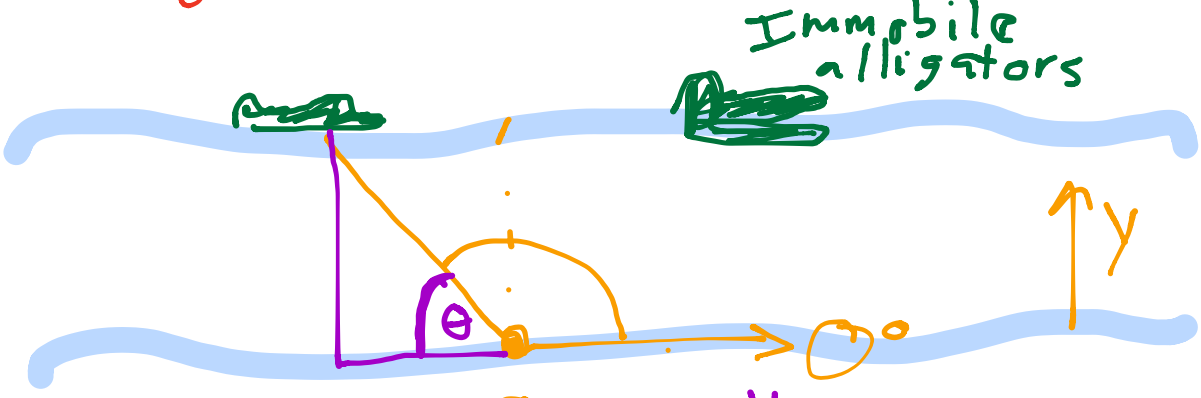
A boat sails @ 2 m/s across a river that is 400 m wide and flows at 1.5 m/s. If the boat sails ⊥ to the shore, how far downstream does it land?



$$t = \frac{Y}{V_y} = \frac{400}{2} = 200\,s$$

$$X = V_x \cdot t = 300\,m$$

Which angle should we steer our boat to end up right across from where we are?



$$\tan\theta = \frac{Opp}{Adj} = \frac{400}{300} = 1.33$$

$$\tan^{-1}(1.33) = 53^\circ$$

$$\phi = 180 - 53 = 127^\circ$$